SAGA: Collaborative Storytelling with GPT-3

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ABSTRACT

When friends live across different time zones, have incompatible work schedules, or have different levels of access to technology, synchronous communication becomes infeasible. To address this challenge, we developed a web application that allows friends to asynchronously collaborate creatively. In this application, multiple people can contribute to the writing of a story, told partially by a natural language AI system. By offloading some of the creative work to the AI, the human writers have the opportunity to also act as readers, being surprised by new events in the story. To gain preliminary insights into the experience of using this system, we conducted an informal pilot study over a span of 5 days. Through this process, we learned that storytelling with an AI system can encourage roleplay, it can be a cathartic experience, and it is curiosity-driven. Our recommendations for future research include (1) investigating new turn-taking strategies, and clearly communicating turns through the interface, (2) providing guidance for the prompt-writing process, perhaps through editable prompt templates, and (3) conducting a thorough evaluation of the system with friend groups of various sizes and timezones.

CCS CONCEPTS

• **Human-centered computing → Collaborative and social computing**.

KEYWORDS

collaborative storytelling, slow gameplay, natural language processing, distributed games

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1 INTRODUCTION

When friends are separated by distance, synchronous group activities become difficult to arrange. This challenge is especially significant when people live in different time zones. Many distance-separated friends are faced with this situation, especially now during the COVID-19 pandemic. Popular communication technologies - such as video calls [Heshmat et al. 2017; Judge and Neustaedter 2010; Judge et al. 2011; Kirk et al. 2010] - revolve around high-engagement synchronous interaction sessions and shared activities. Most online group games also require synchronous interaction sessions [Lin and Sun 2015]. An alternative to these synchronous methods is asynchronously communicating through text-based messaging. However, while messaging can be asynchronous, long delays can seriously disrupt the flow of a conversation. Furthermore, the disrupted natural flow of the conversation can create issues with confusion around message sequencing, interruptions, wasted time, perceptions of indifference about the conversation, and issues with loss of context among other problems [Love and Reagan 2013]. Because delayed communication causes these conversational challenges, we explore non-conversational methods of creating asynchronous connections between friends - specifically through creative expression in the form of storytelling. Storytelling and togetherness are closely related; past research has shown that collaborative storytelling and "storyacting" (roleplaying) can help to create a sense of community [Zepeda 2014].

We designed SAGA (Shared Authoring GPT-3 Application) - an asynchronous collaborative storytelling system. In this system, two or more friends can collaborate with an artificially intelligent language model called GPT-3 (or Generative Pre-trained Transformer 3), which can generate human-like text. GPT-3 was developed by OpenAI using deep learning methods to train on enormous datasets of human-written text [noa [n.d.]].

Through the development and preliminary study of an AI-driven collaborative storytelling system, we set out to answer the following research questions:

(1) How can we develop a system for shared creative expression in an asynchronous manner?
(2) How can we offload the pressure of creative tasks in this system?
(3) How do distance-separated friends experience using this system?

Our contributions include the design and implementation of a novel collaborative storytelling system that can be used by groups of two or more distance-separated friends, as well as a 5-day long pilot study confirming the value of this system in a real-world context at an early design stage in order to assess how the design needs to be adapted in the future. Our recommendations include (1) investigating new turn-taking strategies, and clearly communicating turns through the interface, (2) providing guidance for the prompt-writing process, perhaps through editable prompt templates, and (3)

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conducting a thorough evaluation of the system with friend groups of various sizes and timezones.

2 RELATED WORK

2.1 Collaborative storytelling

Collaborative storytelling is a form of shared creative expression that we learn as children, as it comprises an important component of children's game play activities [Ryokai and Cassell 1999]. Hourcade et al. developed a system called *KidPad*, in which children can work together to build visual storyboards [Hourcade et al. 2004, 2002]. Despite its prevalence among children, collaborative storytelling is effective way of building and strengthening relationships between adults as well. Past research has shown that collaborative storytelling can create a sense of community even among strangers [Gui 2018; Zepeda 2014]. For example, Gui studied how collaboratively telling stories about a virtual game environment (in this case, World of Warcraft) on an online forum created a sense of community and shared experience [Gui 2018]. While these past works study the impact of collaborative storytelling, these storytelling methods are purely human-driven and have a high cognitive cost. Additionally, most of them rely on synchronous collaboration or even physical co-presence. In this project, we investigate how collaborative storytelling can be made asynchronous and cognitively lightweight.

2.2 Asynchronous play

Asynchronous communication through virtual environments [Wu et al. 2015] can be helpful in creating a sense of closeness [Wu et al. 2016]. *Maze Commander* is an asynchronous virtual game played using an Oculus Rift and Sifteo Cubes. In this game, two players collaborate to solve a maze [Sajjadi et al. 2014]. Another example of asynchronous gameplay is *LunchTime*, an interactive multiplayer game about making healthy food choices, where each game is played across 10 days, with each move happening once every 12 hours [Orji et al. 2013]. While SAGA is not a game, it involves game-inspired elements such as turn-taking and playful interaction. We draw inspiration from past work in designing for asynchronous turn-taking. Our system incorporates elements of creativity and collaboration that these past playful systems do not explore.

2.3 Slow technology

Slow technology is a design framework that shifts away from the model of quick fleeting interactions, allowing for interactions to be experienced over months or years [Odom et al. 2012]. Hallnas et al. describe the potential of slow technology to support reflection, rest, and expression, and they emphasize the importance of aesthetics in slow technology [Hallnäs et al. 2001]. An example of this is PhotoBox, a photo printer that is designed to fit within the aesthetic of the home that automatically prints photos at random times over several months[Odom et al. 2012]. Hallnas and Redstrom explain that slow art can be a method of amplification in the way that it brings emphasis to things that may otherwise have quickly passed by. Meanwhile, it also creates abstraction [Hallnäs and Redström 2001]. These are two qualities of slow technology that we are inspired by, and that we apply to the space of slow collaborative storytelling in order to create the senses of anticipation and discovery as the story is slowly revealed.

3 DESIGN

We designed SAGA (Shared Authoring GPT-3 Application) - an asynchronous collaborative storytelling system. SAGA addresses the challenge of creative writing, which is a highly skilled - and at times, personally vulnerable - process. To alleviate this pressure and offload some of the work, one of the writers in the turn-based writing flow is an artificially intelligent language model called GPT-3, which can generate human-like text. Because of the AI's unpredictable nature, the resulting stories are usually humorous and lighthearted, making the experience more fun for the users.

SAGA is a web-based interface, inspired by the design of popular chat clients (Figure 1). To use the system, all users must open the web application on their own devices. By doing so, they are each assigned a randomized color that marks their contributions to the story. At the start of each story, the users must coordinate for building the initial prompt. This prompt forms the basis of the story, and can include things like the setting, genre of the story, and even descriptions of the characters. Through the text input area at the bottom of the screen, users can enter prompts that drive the story forward. To play the game, the users must take turns entering prompts. After each prompt is entered, the AI takes a turn, adding to the story. The story is meant to unfold slowly, operating on the assumption that users will not be working on the story at the same time. Once a turn is submitted, it is stored in the text area (even if the window is closed or ignored for long periods of time). This is especially important given the asynchronous nature of the interactions - users may need to refresh their memory of recent events in the story after returning to it, which may be hours or days later.

4 PILOT STUDY

We conducted an informal pilot study of the system with a friend (P1) of one of the researchers (P2), collaboratively writing stories with them over a span of 5 days. While they both live in the same timezone, they live about 40 km apart and do not see each other in person due to COVID-19 restrictions. During this time, they collaboratively wrote three relatively long stories (72-93 lines long) and one story that quickly went off topic, causing them to reset the system. At the start of the study, they wrote a few short (less than 30 lines) practice stories in order to learn about writing effective prompts. Because of the early stage of research and qualitative nature of this pilot study, the conditions were not controlled in any way. A limitation of this pilot study is that it was conducted with one of the researchers and one other person as participants. In order to gain more insight and generate generalizable findings, future researchers could study the collaborative storytelling experiences of friend groups of various sizes with a diversity of timezones.

4.1 Roleplay and Immersion in Storytelling

The two story-writers quickly learned that telling stories was more immersive and much more humorous when the stories were about them. They added descriptions of themselves as the characters to

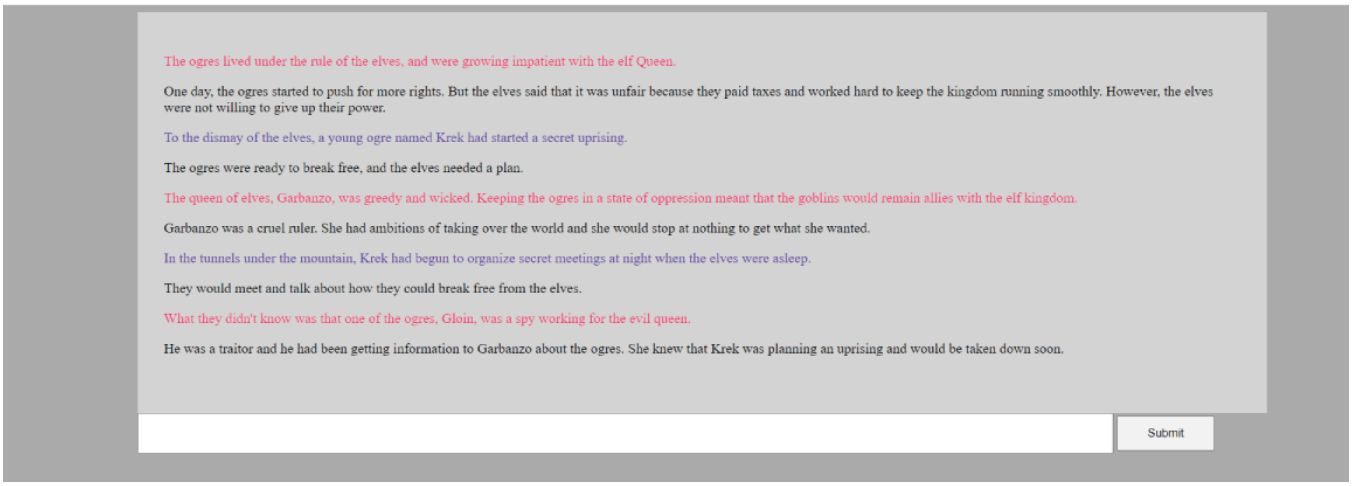

Figure 1: The AI-driven collaborative storytelling web application (SAGA). Lines shown in red and blue are submitted by two different human writers, while the lines shown in black are written by the AI.

the prompt, after telling SAGA to act as a storyteller that tells stories of a specific genre and in a specific setting.

As the AI-driven story began to unfold, they found themselves focusing mainly on controlling their own character's actions. In this way, they were each essentially roleplaying as themselves in this fantasy setting, driving their characters forward while the events of the world were mainly left up to the AI. This is demonstrated in the following exchange:

> ***P1***: *[P1] woke up; it was still dark outside.*
> ***AI***: *"Perfect", she thought, as she prepared to sneak out of the palace to explore the magic waterfall.*
> ***P2***: *"Where do you think you're going?", said [P2], standing in the doorway.*
> ***AI***: *"Anywhere where you aren't lurking around", mumbled [P1], rolling her eyes.*
> ***P1***: *[P1] glanced down at the buckets [P2] was carrying.*

This made the process of story writing very immersive, as if they were in the story themselves. Interestingly, it also created a feeling of connection and togetherness between them, as if in some way they had spent time together on a fictional adventure.

4.2 Cathartic Roleplay

Taking the idea of roleplay even further, they were able to do things as fictional characters that they could not do in real life. For example, one of the stories they wrote was based on P1's workplace, in which there are certain social tensions. Through the story, she was able to express her feelings clearly and stand up for herself in a way that she did not feel comfortable doing in real life. In this way, it was a cathartic experience, allowing her to express her feelings and act the way she wanted to without jeopardizing her career. As the story progressed, they realized that this story was also allowing her to practice expressing herself, with P2 and the AI playing the roles of others in the story and giving her somewhat believable responses.

4.3 Curiosity and Discovery

Because the stories were partially AI-driven, they didn't need to have pre-conceived notions of how the story would go; instead, writing the story became a process of discovery. Because they had not planned out these stories, they were able to discover plot twists just as a reader might. This is demonstrated in the following exchange:

> ***P1***: *"We can't depend on them forever, and this will be our secret. Hurry up now, or I'll tell your mom."*
> ***AI***: *"What? Mom has been dead for decades now..."*
> ***P2***: *[P2] gasped in shock. "Why did nobody tell me?"*
> ***AI***: *"Just go, and don't say anything. I'll make sure to keep it a secret."*
> ***P1***: *Feeling extremely uneasy, [P1] followed her orders.*
> ***AI***: *The evening breeze felt nice as it brushed across her bald scalp.*

In this small passage of the story, we see that the AI revealed two unexpected details about the story that neither of the writers had planned for. First, the AI revealed that one of the characters' mothers had died decades ago, and secondly revealed that one of the characters was bald. Surprises like this made the process of collaborative storytelling exciting and fun for the writers.

5 DISCUSSION AND FUTURE WORK

The design, development, and pilot study of the collaborative storytelling system led us to generate new insights and recommendations for future design. We discuss these findings here.

5.1 RQ1: How can we develop a system for shared creative expression in an asynchronous manner?

A key characteristic of SAGA was that it had to support asynchronous interactions. As a result, we prioritized persistent information storage while developing the web application, such that users would

be able to close or ignore their browser windows for long periods of time, and still have their progress stored when they return. Another priority in this system design was preventing loss of context. With delayed or asynchronous communication, a major challenge is being able to context-switch in and out of conversations without losing awareness of what was previously said. We took this into account when designing the system by displaying the story history at all times, and colour-coding the story contributions so that users will remember which lines were added by them, which ones were added by other people, and which ones were added by the AI. A limitation of this system is that turn-taking is handled entirely by the users. In future collaborative storytelling systems, it would be valuable to have clearer visual indications of whose turn it is to add to the story. Additionally, more investigation is needed about turn-taking styles - perhaps there are more effective alternatives to the sequentially alternating turn taking method.

5.2 RQ2: How can we offload the pressure of creative tasks in this system?

Creative writing is a challenging task for a variety of reasons. Aside from the need for advanced writing skills and creativity, story writing involves extensive planning and preparation for all of the characters, plot, setting, etc. Another form of pressure in the creative writing process is the vulnerability of expressing one's inner thoughts in the form of a narrative. In this system, it was important to offload all of these forms of pressure onto a non-human agent, allowing the human storytellers to have a lighthearted and fun experience in which they feel connected to their friends. To achieve this, we incorporated an artificially intelligent language model (GPT-3) to act as one of the writers. By doing so, the pressure of driving the story forward is shared by the AI. Collaborating with an AI system makes storytelling a process of discovery that is humorous and reduces each individual's vulnerability in expressing themselves, while still allowing them to feel a sense of ownership over the story. Prompt-writing for SAGA is still handled entirely by the human users. This gives the users a lot of freedom and control, but it is not an intuitive process. Future AI-driven storytelling systems could provide more guidance to the users for prompt-writing, perhaps through a series of editable prompt templates.

5.3 RQ3: How do distance-separated friends experience using this system?

The pilot study showed that one of the ways in which distance-separated friends feel most connected with one another when using the collaborative storytelling system is through roleplaying as themselves. Future research could explore how the system design can better support this by prompting SAGA in a way that causes the AI to generate non-character events and plot development, allowing the human writers to have full control over their own characters' actions and dialogue. A valuable finding was that telling stories about oneself can be cathartic, and can also be a form of social practice. This has implications for non-storytelling conversational agents as well. For example, consider a system that enables the AI agent to take on different personalities and roles based on a character description, such that the human user can practice talking to people that they might encounter in real life. Of course, the findings of this pilot study are limited and subject to personal biases, and future research is needed to reach more generalizable findings.

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